

What is claimed is:

1. A honeycomb structural body having a plurality of cells to function as a passage for a fluid divided by porous partition walls, specified cells being plugged at one of open end faces and the remaining cells being plugged at other end face alternately, a fluid flowing into the open end face side of one set of cells being caused to pass through the cells and permeate through the partition walls, thus permeated fluid being discharged from the open end face side of the other cells, wherein a cross-section pattern of the partition walls perpendicular to flow direction of the fluid has a grille shape of which gratings cross in x axis and Y axis directions, and there are at least two kinds of cells different each other in their cross-sectional areas perpendicular to the flow direction of a fluid to be filtered by virtue of changing intervals of the partition walls in the x axis direction and/or intervals of the partition walls in the y axis direction.

2. The honeycomb structural body according to claim 1, wherein the intervals of the partition walls in the x axis direction and/or the intervals of the partition walls in the y axis direction are determined by a repetition of which a unit is a prescribed pattern, whereby intervals of the partition walls are changed, as predetermined.

3. The honeycomb structural body according to claim 1, wherein one of the open end faces of the specified cells and the other open end face of the remaining cells are alternately

plugged to form a checkerwise pattern as a whole.

4. The honeycomb structural body according to claim 1,
wherein a plurality of cells having largest cross-section among
said plurality of cells has a rectangle shape and thickness of
5 partition wall defining a long side of the cell having the
largest cross-section is thicker than thickness of partition
wall defining a short side of the cells having largest
cross-section.

5. The honeycomb structural body according to claim 1,
10 wherein the partition wall has a porosity of 20% or more.

6. The honeycomb structural body according to claim 2,
wherein the partition wall has a porosity of 20% or more.

7. The honeycomb structural body according to claim 1,
wherein the partition wall is made of a material containing a
15 ceramic and/or a metal as major components.

8. The honeycomb structural body according to claim 2,
wherein the partition wall is made of a material containing a
ceramic and/or a metal as major components.

9. The honeycomb structural body according to claim 5,
20 wherein the partition wall is made of a material containing a
ceramic and/or a metal as major components.

10. The honeycomb structural body according to claim 6,
wherein the partition wall is made of a material containing a
ceramic and/or a metal as major components.

25 11. The honeycomb structural body according to claim 7,
wherein the major components forming the partition wall are at
least one material selected from the group consisting of

cordierite, mullite, alumina, spinel, silicon carbide, silicon nitride, aluminum nitride, zirconia, lithium aluminum silicate, aluminum titanate, Fe-Cr-Al metals, metal silicon, activated carbon, silica gel, and zeolite.

5 12. The honeycomb structural body according to claim 1, wherein a catalyst is carried on surface of the partition wall and/or pore surface inside the partition wall.

13. A filter structure comprising a honeycomb structural body having a plurality of cells to function as a passage for
10 a fluid divided by porous partition walls, specified cells being plugged at one of open end faces and the remaining cells being plugged at other end face alternately, a fluid flowing into the open end face side of one set of cells being caused to pass through the cells and permeate through the partition walls, thus
15 permeated fluid being discharged from the open end face side of the other cells, wherein a cross-section pattern of the partition walls perpendicular to flow direction of the fluid has a grille shape of which gratings cross in x axis and Y axis directions, and there are at least two kinds of cells different
20 each other in their cross-sectional areas perpendicular to the flow direction of a fluid to be filtered by virtue of changing intervals of the partition walls in the x axis direction and/or intervals of the partition walls in the y axis direction; said honeycomb structural body being installed in a fluid passage
25 to collect substances to be removed from the fluid.

14. The filter structure according to claim 13, wherein the cells having largest cross-sectional area perpendicular to

fluid flow direction among the cells forming the honeycomb structural body are open without being plugged at an end face on an inlet port side of the fluid.

15 15. The filter structure according to claim 13, wherein
5 the honeycomb structural body is installed in such manner that
a total sum of a cross-sectional area perpendicular to the fluid
flow direction at end face of cells that are open on an end face
on an inlet port side of the fluid is larger than or equal to
a total sum of a cross-sectional area perpendicular to the fluid
10 flow direction at an end face of cells that are open on an end
face on an outlet port side of the fluid.

16. The filter structure according to claim 13, wherein
the honeycomb structural body is used to collect and remove fine
particulates in exhaust gas as a filter.

15 17. A die for forming the honeycomb structural body by
extrusion comprising a die base having at least two surfaces,
which is provided with a raw material introducing part for
introducing a raw material from a first opening on one side and
an extrusion part communicating with the raw material
20 introducing part to extrude the raw material supplied by the
raw material introducing part from a second opening on the other
side, thereby forming a honeycomb structural body, wherein the
cross-section of the extrusion part composed of the second
opening on the plane perpendicular to the direction in which
25 the raw material is extruded has a pattern of a grille as a whole,
with crossing slits opening both in the x axis direction and
in the y axis direction, wherein either the intervals between

the two adjacent slits opening in the x axis direction or the intervals between the two adjacent slits opening in the y axis direction are not equal, with the slits being arranged at unequal intervals either in the x axis direction or the y axis
5 direction.

18. The die for forming the honeycomb structural body by extrusion according to claim 17, wherein either intervals between two adjacent slits opening in x axis direction or intervals between two adjacent slits opening in the y axis
10 direction are not equal, with other intervals being equal.

19. The die for forming the honeycomb structural body by extrusion according to claim 17, wherein both the intervals between the two adjacent slits opening in the x axis direction and the intervals between the two adjacent slits opening in the
15 y axis direction are not equal and a pattern of unequal intervals is identical in both x and y axis directions.

20. The die for forming the honeycomb structural body by extrusion according to claim 17, wherein both the intervals between the two adjacent slits opening in the x axis direction and the intervals between two adjacent slits opening in the y
20 axis direction are not equal and a pattern of unequal intervals in the x axis direction differs from a pattern of unequal intervals in the y axis direction.